Mathematics | Advanced Algebra

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
5 weeks	Prerequisite Skill Review: Real Numbers Exponents Radicals Rationals Distance Midpoint	Ch P	• Operations with Rational and Irrational Numbers • Equivalent Expressions • Rational Exponents • Radical Notation • Rational Expressions • Perimeter, Area, Distance Formula • Coordinate Graphing • Midpoint Formula	• Find the sum and product of two rational numbers, two irrational numbers, and one rational and one irrational number. • Explain the results of those operations and categorize the results in the real number system. • Recognize equivalent expressions • Explain the relationship between rational exponents and radical notation. • Convert from exponential form to radical form and vice versa • Perform operations using rational exponents • Add rational expressions • Subtract rational expressions • Multiply rational expressions • Divide rational expressions • Computing perimeters using the distance formula • Computing areas using the distance formula • Understand relationships between (x,y) as a solution to an equation

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
5 weeks	Circles, Quadratics, Solving, Complex, Inequalities	Ch 1	• Single Variable Equations Single Variable Inequalities • Factoring Completing the Square • Rational and Radical Equations • Complex Numbers • Properties of Complex numbers Operations with complex numbers • Conjugates of Complex Numbers • Solve quadratic equations Complex solutions • Quadratic Equations Complex Numbers • Equation of a Circle • Solving Quadratic and Rational Inequalities	• Create and Solve equations and inequalities o Quadratic o Simple Rational o Exponential • Factoring to find zeros • Completing the square to find zeros • Completing the square to find extreme values • Applying knowledge of zeros and extremes to real work situations • Solve rational equations • Solve radical equations • Find & eliminate extraneous solutions • Understand definition of a complex number • Identify parts of a complex number • Add complex numbers • Subtract complex numbers • Multiply complex numbers • Find the conjugate of a complex number • Find the quotient of a complex number • Find the modulus of a complex number • Quadratic Formula • Completing the Square • Simplifying radicals with “i” • Identifying conjugate pairs • Solve using completing the square. • Derive Quadratic Formula • Write in standard form

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
4 weeks	Functions & Function graphs	Chapter 2	• Domain and Range of Inverse Functions • Graphs of functions • Transformations • Transform quadratic expressions • Key Features of the graph of a function • Composition of Functions • Inverse Functions • Verifying Inverses by Compositions	• Produce an invertible function from a non-invertible function by restricting the domain • Graphing functions by hand • Graphing functions using technology • Perform transformations on a function • Recognize transformations done to a given function • Determine if a function is even or odd • Factoring quadratics to reveal zeros • Changing from standard form to vertex form using completing the square • Finding zeros • Interpreting Max / Min based on vertex form • Interpreting key factors of graphs of functions (see standard for key features) • Interpreting key factors of graphs of functions (see standard for key features) • Identifying end behavior • Factoring quadratics to reveal zeros • Changing from standard form to vertex form using completing the square • Compose functions • Finding the inverse of a function • Verify, by composition, that a function is an inverse of another function • Reading inverse values from a table or a graph

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
4 weeks	Polynomials	Ch 3	• Key Features of the graph of a function • Zeros of Polynomials • Graphing Polynomials • Factoring • Completing the Square • Roots of polynomial functions • Zero Product Property • Imaginary Root Theorem • Graphs of Polynomial Functions • Remainder Theorem • Polynomial Division • Solve polynomial functions Identify complex root	• Interpreting key factors of graphs of functions (see standard for key features) • Identify zeros of polynomials using factorization • Rough graph a polynomial using zeros • Factor Polynomials • Factoring to find zeros • Completing the square to find zeros • Completing the square to find extreme values • Applying knowledge of zeros and extremes to real work situations • Quadratic formula • Factoring - all types • Identifying conjugate pairs
1 week	Rational funtions & their graphs	Ch 4	Graphs of Rational Functions	• Graph functions by hand • Graph functions using technology • Identifying asymptotes • Identifying end behavior
2.5 weeks	Exponential & logarithmic functions	Ch 5	Graphs of Exponential functions Graphs of Logarithmic functions Exponents and Logarithms as Inverses Exponents and Logarithms Linear Functions vs. Exponential Functions Exponential Functions Exponential Growth/Decay Properties of Logarithms	• Graph functions by hand • Graph functions using technology • Identifying key features • Identifying period, midline & amplitude • Solving problems involving logarithms and exponents • Converting an exponential equation to its logarithmic equivalent • Identify if a function is linear or exponential • Identify if a real life application is linear or exponential • Identify if a function is linear or exponential • Identify exponential growth or decay • Interpreting expressions for exponential functions • Understanding rapid growth rate of an exponential function • Construct linear or exponential function given a table, graph or description

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
2.5 weeks 3 weeks	Solving logarithmic & exponential equations Systems of Equations & Inequalities	Ch 5 Ch 6	• Solutions of Equations (I.e. f(x)=g(x)) • Systems of Equations with Linear and/or Quadratic Equations • Linear Inequalities	• Solve an exponential or logarithmic equation o Using graphs o Using tables • Explain the relationship between the algebraic solution, graphical intersections, and numeric intersection. • Solve Systems of Equations (multivariable systems) o Algebraically o Graphically • Graphing Two Variable Inequalities • Graph a System of Inequalities • Graph the solution
2 weeks	Matrices	Ch 7	Matrix Representation of a System Systems of Equations Matrix Identities for Addition and Multiplication of Matrices Transform Vectors Scalar Multiplication on a Vector Sum, Difference, and Product of Matrices Matrix Product	• Write a matrix equation for a system of equations • Solve the System using matrices • Find the inverse of a Matrix • Adding and multiplying matrices of appropriate dimension. Recognizing identity matrices. • Matrix multiplication • Recognizing vectors as matrices • Multiply matrices by a scalar • Students will be able to perform Addition, Subtraction, and Multiplication of Matrices of appropriate dimensions. • Students will be able to demonstrate given Matrix A, B, and C of n x n dimensions, that while both the Associative and Distributive properties of Multiplication hold true, the Commutative Property of Multiplication does not. (i.e. AB does not equal BA)

Weeks	ORGANIZING THEME/TOPIC		CONTENT	FOCUS STANDARDS & SKILLS
.5 week on Binomial Thm 2 week sequence & series (as time permits)	Sequences, Series, & Binomial Thm	Ch 8	• Binomial Theorem • Arithmetic Sequences Geometric Sequences • Series and Sequence Introduction	• Expand • Create Pascal's Triangle • Combinatorial Patterns • Write a recursive or explicit formula for an arithmetic sequence • Write a recursive or explicit formula for an geometric sequence • Derive the formula for the sum of a finite series • Apply the formula for the sum of a finite series.
3 weeks + ? (buildings may collectively decide to move trig ahead of sequences and series if time is critical)	Trigonometry	Trig Supplement	• Further Development of the Unit Circle • Symmetry Periodicity • Simple Trig Identities • Law of Sines and Law of Cosines • Applications with the Law of Sines and the Law of Cosines • Modeling with Trigonometric Functions • Restricting the domain to create an Inverse of a Trigonometric Function • Solve Trigonometric equations using the inverse function • Sum and Difference Identities for Sine, Cosine, and Tangent • Area of a Triangle	• Attaching coordinates to angles in the unit circle • Finding trigonometric values • Identifying coordinate points associated with given radian measures • Explain symmetry using the unit circle • Explain periodicity using the unit circle • Sin^2+Cos^2=1 • Tan=(sin/cos) • Sec,Csc,Cot • Prove the Law of Sines • Prove the Law of Cosines • Solving Oblique Triangles • Apply the Law of Sines and the Law of Cosines to solve any triangle • Identify appropriate graphs given characteristics of the graph • Identifying the domain where a function is invertible • Utilize technology to solve trigonometric equations • Interpret answers to trigonometric equations in the context of the problem • Prove sum and difference identities for sine, cosine and tangent • Use sum and difference identities to solve problems • Derive the formula: A=0.5absinC